INTRODUCTION TO UAVS AND WAYPOINT GUIDANCE / PLANNING:

* Uses
* Conventionally are guided to follow a series of waypoints
* UAV using a LOS guidance to navigate waypoints will travel in straight lines between waypoint
* UAV navigates to current active waypoint, reaches waypoint radius, and next waypoint becomes active

Path has already been generated, would be beneficial to not re-plan

Mission objective is to track a path with minimal deviation to maximize sensor converge

Why accurately following a pre-defined path is of interest

* Navigating a narrow passage
* Surveying a road, treeline, or other terrain
* Tracking path accurately using LOS guidance requires high resolution of waypoints
* Waypoints are typically pre-planned on a dedicated ground station by an operator or generated from a path planner
* The more detailed the path, the more waypoints are necessary
* Known obstacles can also be planned around
* Obstacles move / environment changes, path must be re-planned and relayed to UAV
  + Communication overhead
  + Beyond los
  + Radio silence
* Navigating to outdated waypoints could result in violation of obstacle
* Other methods used for avoiding dynamic obstacles
  + On board, no communication with ground station, implemented into guidance
  + Attractive and repulsive artificial forces
* As pointed out in Tsourdos, path planning typically consists of multiple algorithms
  + Initial obstacle free path (methods)
  + Path refinement
* Path planning serves an important purpose in finding a route that satisfies both mission and vehicle constraints
* How do we follow a pre-planned path, avoid obstacles, and get back onto the pre-planned path without re-planning
* An obstacle is an object or region to be avoided, such as
  + Controlled airspace
  + Buildings
  + Terrain
  + Other vehicles
* Obstacles can be static or dynamic in nature
* Typical method for obstacle avoidance is to supplement or regenerate the path with intermediate waypoints that avoid the obstacle

PROBLEM STATEMENT:

DESCRIPTION OF METHODS: